Commercial Vehicle Weight

Federal Weight Standards

Intro

- My name is Bill Gale, and have been a resident of the State of Michigan for the last 35 years. For the last 5 ½ years, I have been employed by Universal Truckload Services, where I serve as the Vice President of Equipment Services. I have been continuously employed in the Transportation field since March 1977, always in the maintenance and equipment departments. My duties have encompassed everything from Mechanics helper, Mechanic, Shop Foreman, Regional Manager, Division Manager, and now Vice President.
- Universal overseer's six major Trucking Companies, including Universal Am-Can, Great American Lines, Mason Dixon Truck Lines, Louisiana Transportation, ETI and Mason Dixon Intermodal.
- These companies have over 3200 independent Owner Operators leased on to these companies, as well as over 125 company drivers.
- We own over 3,400 pieces of equipment that includes tractors, trailers, chassis', lift and support equipment.
- Our trailers are a mix of vans, flats and reefers for a total of 1605 units
  - 890 vans and reefers, 715 flat bed trailers
  - 124 heavy haul (7.7%)
    - 31 Michigan Heavy Haul (1.9%)

Our purpose here today is to

1. Show our support for quality Roads in our state, as they are a vital part of our companies operation for safety and cost of doing business,

2. To explain why we see multi-axles as a vital part of our day to day operations, and the positive effect they have not only on our business climate, but also on our roads.

William Gale
12755 E Nine Mile Rd
Warren, MI 48089
586-834-4050
bgale@goutsi.com

Maximum Axle Weights

Federal

- Steer Axle:
  - 12,000 lbs.
- Single Axle:
  - 20,000 lbs.
- Tandem Axle:
  - 34,000 lbs.
- Gross Vehicle Weight:
  - 80,000 lbs. S

State of Michigan

- Steer Axle:
  - 18,000 lbs.
- Single Axle:
  - 18,000 lbs.
- Tandem Axle:
  - 32,000 lbs.
- Gross Vehicle Weight:
  - 164,000 lbs. Steer axle

3

Federal Standards

- National weight standards apply to commercial vehicle operations on the Interstate Highway System, an approximately 40,000-mile system of limited access, divided highways that spans the nation.
- Federal commercial vehicle maximum standards on the Interstate Highway System are:
- Steer Axle: 12,000 lbs.
- Single Axle: 20,000 lbs.
- Tandem Axle: 34,000 lbs.
- Gross Vehicle Weight: 80,000 lbs.

4

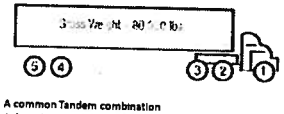
80,000 # Federal Weight Standards,

- The allowable maximum weights:
  - Steering axle is 12,000 lbs., distributed between two (2) tires, each supporting 6,000 lbs. per tire.
  - Tractor drive tandem axles (2) is 34,000 lbs., distributed between four (4) wheel positions, each with two (2) tires, carrying 4,250 lbs. per wheel.
  - Trailer tandem axles (2) is 34,000 lbs., distributed between four (4) wheel positions, again each with two (2) tires, carrying 4,250 lbs. per tire.
  - Trailers with 122" spread axle setup allows 40,000 lbs. distributed over four (4) wheel positions each with two (2) tires, carrying 5,000 lbs. per tire.
- This vehicle, carrying 80,000 pounds, would be responsible to stop roughly 8,000 pounds per wheel position.

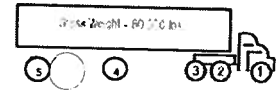
5

Weight per Axle

- Truck weight restrictions use the number of axles on a vehicle as a basic guideline. According to DOT weight regulations, an axle can help distribute the gross weight of the vehicle.
- A vehicle with a single rear axle may only haul 20,000 lbs.
- A tandem axle vehicle may haul 34,000 lbs. (If axles are spaced between 40" apart but not more than 96" apart).
- A two axle Group may haul 40,000 lbs., (If axles are spaced at 122" or more).
- The maximum gross vehicle weight for any commercial vehicle is 80,000 lbs.



A common Tandem combination
Axle 1=12,000,
Axles 2,3= 17,000 each
Axles 4,5 =17,000 each
Gross Allowable Weight is 80,000 lbs.



A common tandem tractor, spread axle combination
Axle 1= 12,000
Axle 2, 3= 17,000 each
Axle 4,5 = 20,000 each

Gross allowable weight is 80,000 lbs.

- The DOT also establishes truck weight restrictions for bridges.

6

Bridge Formula Weights

- The purpose for bridge weights is to reduce the risk of damage to bridges. The formula requires **more axles** or a **longer wheelbase** in order to compensate for increased vehicle weight. The formula is based on the number of axles and the spacing between the axles in a tractor-trailer combination. Commercial vehicles with longer wheelbases or **multiple axles** may still be able to cross these bridges with the additional weight while vehicles with **single axles** or shorter wheelbases may have to detour around weight-restricted bridges because of their **inability to spread the weight** over a larger area.

7

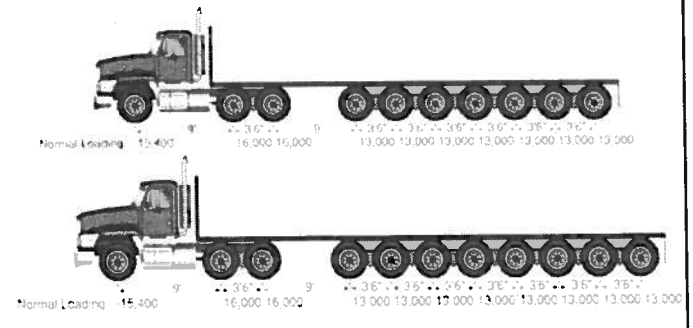
Michigan Vehicle Code Act 300 of 1949

- Section 257.722-Maximum Axle Loads
- Units with multi axles: (5 axles or less)

Axle Spacing on units	Exceeding 80,000 #	80,000# or less
– Axles spaced < 3 ½'	9,000 lbs. per axle	9,000 lbs. per axle
– Axles spaced > 3 ½' but < 9'	13,000 lbs. per axle	13,000 lbs. per axle
– Axles spaced > 9'	18,000 lbs. per axle	20,000 lbs. per axle
– Part of tandem assembly	16,000 lbs. per axle (32,000 lbs. for one group only)	17,000 lbs. per axle (34,000 lbs. per tandem group)
– One single axle	18,000 lbs. per axle	18,000 lbs. per axle

8

Examples of Michigan Multi Axle Units



Although these are legal weights, it is an equipment violation to exceed the manufacturer's displayed load rating on any tire

9

Michigan and Multi-Axle Units

- While the gross vehicle weights in Michigan are higher then the Federal Weights, our trucks ride on more axles, our axle weights are less, spreading the weight out. This not only allows less wear and tear on the roads, but also allows less trucks as well as providing additional economic benefits.
- Many Michigan business's rely on the use of these vehicles to help in keeping the costs of their products in line, allowing more Michigan commerce and jobs staying in our State.
- Examples are the Steel Industry, Construction and Highway builders, Logging, and Farming, especially during harvest.

10

Michigan 8-Axle Trailer

- The allowable maximum weights:
  - Steering axle is 12,000 pounds**, distributed between two (2) tires, each supporting 6,000 pounds per tire.
  - Tractor drive tandem axles (2) is 32,000 pounds, distributed between four (4) wheel positions, each with two (2) tires, carrying 4,000 pounds per wheel. (250 # less than the Federal Standards). A reduction of 6% less weight per tire against the road.
  - Trailer eight axles (8) is 104,000 pounds, distributed between sixteen (16) wheel positions, again each with two (2) tires, carrying 3,250 pounds per tire. (1,000 #'s less than the Federal Standard). A reduction of 30.7% less weight per tire against the road.
- A Trailer grossing 80,000 lbs., with 5-axles, would require each axle to support and stop an average of 16,000 lbs., the same vehicle, grossing 148,000 pounds, (68,000#'s more than the Federal Standard), would require each axle to support and stop an average of 13,454 lbs., or 2,546 lbs. less per axle, or 15.9% less weight distributed over the road surface.

11

Braking

	Federal Weight Limits			Michigan-Multiaxle			
	Each Axle	# axles	Combined	Each Axle	# axles	Combined	
Steer Axle	12,000	1	12,000	15,000	1	15,000	
Tandem Drive Axles	17,000	2	34,000	16,000	2	32,000	
Trailer Axles	17,000	2	34,000	18,000	1	18,000	
				13,000	7	91,000	
Axles	5				11		
Gross Weights			80,000			156,000	Increased Braking
Braking Weight per Axle	5		16,000	11		14,182	12.8%
Wheel position	10		8,000	22		7,091	12.8%
Tire	18		4,444	42		3,714	19.7%

12

Effect of Tires on Roads

- Tires are rated by the width of tread for the allowable weight distributed on the road way.
- Michigan Vehicle Code Section 257.722 part (7) The normal size of tires shall be the rated size as published by the manufacturers, and the maximum wheel load permissible for any wheel shall not exceed 700 pounds per inch of width of tire.

13

Standard Tires Used

- The most commonly used tires are mounted on a rim 8.25" wide and 22.5" diameter, will have an overall inflated width between 11.2" to 12".
- At 700 pounds per inch, this would allow each tire to support safely up to 7840 pounds in a single wheel application (steering axle), and up to 15,680 pounds in a dual wheel position.

14

Tire Note

- Michigan does allow in excess of the 12,000 pounds on the steering axle, as long as the axle is rated by the manufacture and the tire size, rating and width still will allow its weight.
- A standard balloon tire, with a 12.5" overall inflated width is capable of carrying 8,750 #'s per tire or 17,500 #'s on the axle.

15

Other Factors

- Average weight of a Tractor and Trailer with 5 axles 32,000 lbs.
- Average weight of a Tractor and Trailer with 11 axles, utilizing lighter weight trailers 42,000 lbs.
- The maximum payload carried on each can reach:
  - 5 axle unit: 48,000 pounds
  - 11 axle unit 109,000 pounds-(227% more)
    - Thus reducing the # of vehicles on our Highways carrying the same quantity.

16

Fuel Economy

- Based on our own companies fuel averages
  - The standard 5 axle units average: 5.72 mpg ($0.699/mi)
  - The multi axle units average: 4.53 mpg ($0.883/mi)

  Assuming cost of fuel at $4.00 per gallon,

  The cost to move one ton of freight per mile is:

  -5 axle units; $0.02913/ton (24 tons)

  -11 axle units: $0.01766/ton (50 tons)

  Utilizing the multi-axle units equates to a 64.9% reduction in fuel usage.

17

In Conclusion

- **Safety:** Multi Axle units are equipped with more brakes on the vehicle and each brake stopping less weight, (an average of 13-20%).
- **Capacity**: With increased carrying capacity, multi axle units make it possible to have less trucks on our highways, (hauling up to 2.1 times more freight).
- **Environment:** With the increased capacity and less fuel needed (up to 75% less) to move more weight, reduces our needs for foreign oil and better air quality.
- **Commerce:** Michigan business's and jobs are relying on multi-axle equipment to allow them to remain competitive in there own business.
- **Driver Shortage:** Allows us to better utilize our Michigan Driver pool, by being more productive.

18